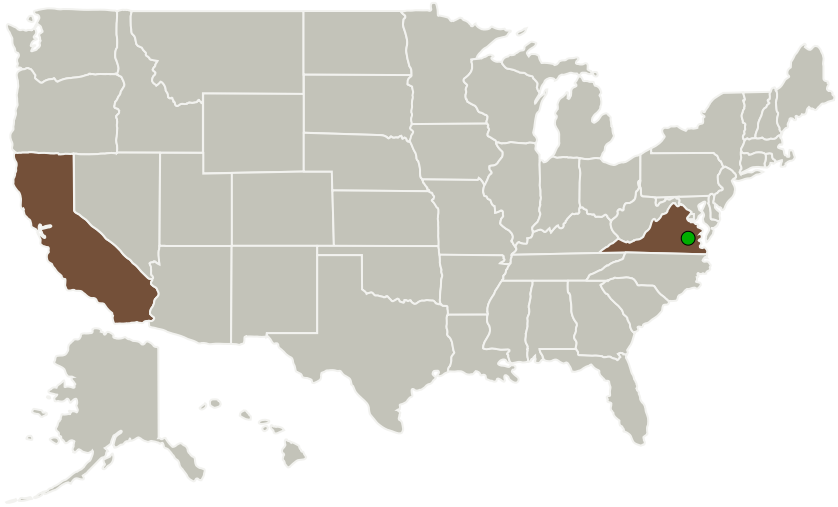
Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts, Phase I

Completed Technology Project (2015 - 2015)

Project Introduction

The objective of this research is to create a generic advanced Flight Management System (FMS) platform that could be used for evaluation of autonomous trajectory-based operation concepts. The research addresses the following deficiencies: most FMSs have limited advanced features; are specific to a single aircraft type; expensive and protected by FMS manufacturers. The proposed FMS platform will enable users to deploy a wide array of autonomy enabling FMS features by the click of a button. Some of the proposed features include: (i) air-ground & inter-aircraft trajectory negotiation, (ii) 4D Trajectory-Based Operations (4DTBO), (iii) high-fidelity wind modeling for improved predictability, (iii) trajectory planning options based on environmental and efficiency considerations, and (iv) advanced guidance modes such as Required Time of Arrival (RTA) and 4DFMS. A key feature of the proposed research is the integration of this platform and its features with NASA's Multi-AirCraft Simulation (MACS) platform. Phase I research will identify the complete array of features for possible inclusion in this platform. Moreover, Phase I will demonstrate select features through the interface to MACS. Phase II research will elevate the technology readiness level suitable for deployment in Human-In-The-Loop simulation pilot stations.

Primary U.S. Work Locations and Key Partners



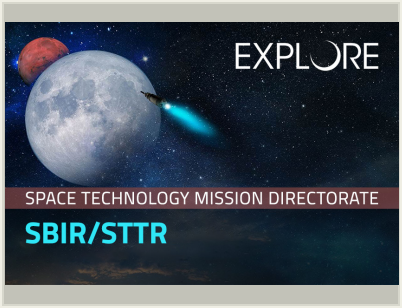


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Table of Contents

Small Business Innovation Research/Small Business Tech Transfer

Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts, Phase I

Completed Technology Project (2015 - 2015)

Organizations Performing Work	Role	Type	Location
Optimal Synthesis, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Los Altos, California
Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
California	Virginia

Project Transitions

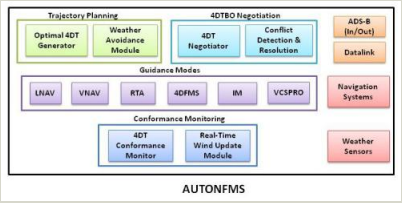
June 2015: Project Start

December 2015: Closed out

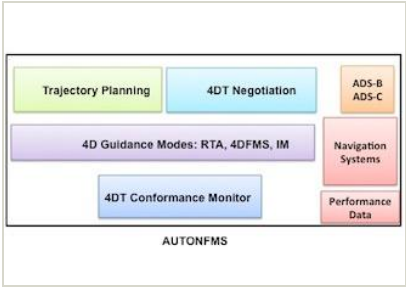
Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138892)*

Images



Briefing Chart
Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts Briefing Chart *(https://techport.nasa.gov/image/132534)*



Final Summary Chart Image
Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts, Phase I Project Image *(https://techport.nasa.gov/image/134419)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Optimal Synthesis, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Veera V Vaddi

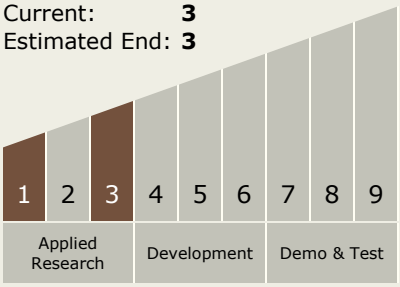
Co-Investigator:
Veera Vaddi

Generic FMS Platform for Evaluation of Autonomous Trajectory-Based Operation Concepts, Phase I

Completed Technology Project (2015 - 2015)

Technology Maturity (TRL)

Start: **1**
Current: **3**
Estimated End: **3**



Technology Areas

Primary:

- TX10 Autonomous Systems
  - TX10.3 Collaboration and Interaction
    - TX10.3.3 Goal and Task Negotiation

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System